phry does not admit of this conclusion. The author has adopted throughout the calculations in this paper the supposition that the hydrogen in water is as 2 to 15 to the oxygen; and consequently, he says, has taken the number 15 to represent the latter element. If the hypophosphorous acid be regarded as a simple compound of oxygen and phosphorus, it will consist of 45 phosphorus + 15 oxygen; phosphorous acid of 45 phosphorus + 30 oxygen; phosphoric acid of 45 phosphorus + 60 oxygen.

Sir Humphry concludes this paper with some incidental observations relating to the compounds of phosphorus.

New Experimental Researches on some of the leading Doctrines of Caloric; particularly on the Relation between the Elasticity, Temperature, and latent Heat of different Vapours; and on Thermometric Admeasurement and Capacity. By Andrew Ure, *M.D. Communicated by* W. H. Wollaston, *M.D. F.R.S.* Read April 30, 1818. [*Phil. Trans.* 1818, *p.* 338.]

This paper is divided into three sections. In the first the author, after taking an historical view of the different experiments undertaken by Robinson, Watt, Dalton, Biot, and some others, relating to the elastic force of vapours arising from different bodies at different temperatures, and after pointing out the sources of error and imperfection to which they are liable, proceeds to describe the apparatus which he employed, which is further illustrated by an annexed drawing. The space which contains the vapour for experiment is about half an inch of a barometer tube, against which the oblong bulb of a delicate thermometer rests so as to indicate the true temperature. The contrivance is such, that though the liquid and incumbent vapour are restricted to the summit of the tube, its progressive range of elasticity may be measured from 0° to 200° above the boiling point of water, or from an elasticity of 0·07 inch to that capable of sustaining 36 feet of mercury, without heating the mercurial column itself. In this section of the paper are several tables of results, showing the elastic force of the vapour of water in inches of mercury, at temperatures between 24° and 312°; and also that of alcohol, ether, oil of turpentine, and naphtha. The second section of Dr. Ure's paper relates to thermometric admeasurement, and to the doctrine of capacity. He does not consider the thermometer liable to the uncertainties which are supposed to belong to it by Mr. Dalton, but that it is an equable measure of heat, in consequence of its possessing an increasing rate of expansion, and which is compensated for by a quantity of the quicksilver getting out of the bulb into the tube, and consequently out of the action of the heat, the bulb being the only part heated in all ordinary cases.

In the third section, relating to the latent heat of different vapours, Dr. Ure details experiments made to ascertain the caloric existing in different vapours, and the temperatures at which they respectively acquire the same elastic force.

The apparatus employed consisted of a small glass retort only, the globular receiver being surrounded by a certain quantity of water of known temperature. Two hundred grains of the liquid, whose vapour was to be examined, were rapidly distilled from this retort into the globe, and the rise of temperature in the surrounding water became the measure of the latent heat. A table follows, exhibiting the experimental results on the latent heat of several vapours: whence it appears that 967° is the latent heat of steam, 442° that of alcohol; of ether, 302·3°; of oil of turpentine and of petroleum, 177·8°; of nitric acid, 531·9°; of liquid ammonia, 837·2°; and of vinegar, 875°.

The paper concludes with a proposal for employing the vapour of alcohol in certain cases, for the purpose of propelling machinery.

Observations on the Heights of Mountains in the North of England. By Thomas Greatorex, *Esq. F.L.S. In a Letter to* Thomas Young, *M.D. For. Sec. R.S.* Read May 7, 1818. [*Phil. Trans.* 1818, *p.* 395.]

Wishing to measure Skiddaw geometrically, the author employed a staff about 28 feet long. Its graduation commenced at 0°, placed about 3 feet above its lower end, from which to the top was exactly 25 feet. A stationary barometer was next placed 10 yards above the lake, and its variation and that of a thermometer were noted every half hour. Another barometer and thermometer were then set upon the summit of the mountain, and their respective heights accurately observed. A telescope, with cross wires, was then carefully levelled, and the wires made to intersect the highest point of the mountain. It was then pointed in the direction of the most convenient descent, and the staff carried down the hill till its top exactly coincided with the cross wires, the level of the telescope being carefully preserved. The perpendicularity of the staff was ascertained by plumb lines; and as it was seldom more than 40 feet from the telescope, no allowance was necessary for the earth's curvature. The most exact mode of managing the pole, says the author, was to stop my assistant when I observed its top to be about an inch above the cross wires, and then it was pressed gradually into the earth till an exact coincidence was obtained. The telescope was then carried down to the pole, levelled and placed in exact correspondence with zero. The pole was again carried to a new station, and this mode continued for fifty yards of descent. The barometer was then again set up and examined, and the process continued to the foot of the mountain. The height of Skiddaw, by levelling, was 1012 yards $3\frac{1}{2}$ inches.

Annexed to this paper are the results of several barometrical observations made on the summit of Skiddaw, and continued at different distances of fifty yards each down to the foot of the mountain.